VEER NARMAD SOUTH GUJARAT UNIVERSITY SURAT

T.Y.B.Sc.

Statistics

In force from June 2006

T.Y.B.Sc. Theory Papers		400 Marks
S 301 -	Mathematical Statistics - IV	100
S 302 -	Statistical Inferences - V	100
S 303 -	Sampling & Design of Experiment - VI	100
S 304 -	Applied Statistics - VII	100
T.Y.B.Sc. Practical Papers		200 Marks
S 305 -	Statistical Practical-I	50
	Statistical Practical-II	50
	Statistical Practical-III	50
	Statistical Practical-IV	50
T.Y.B.Sc. CAN Course		100 Marks
	Operation Research	

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T.Y.B.Sc.

Statistics

(PRINCIPAL)
STATISTICS PAPER - 301
(MATHEMATICAL STATISTICS)

Chehyshev's Inequality weak law of large numbers (with known variance) characteristic function and its elementary properties, Inversion Theorem , central limit theorem with proof of lind berg levy from only and statement of Liapounoff from.

Some special distributions and their properties

Trinomial, Log normal, Cauchy & Laplace distributions. Distribution of order statistics, Bivariate normal distributions.

Correlation and regression

Linear and multiple regression. Partial and multiple correlation for three variates only. Sampling distribution of sample correlation co- efficient from bivariate normal population when population correlation co- efficient is zero. Z-trance formation and its use.

The course is generally covered by.

1. Mark Fisz- Probability theory and Mathematical statistics (Third Edition) Articles : 4.1, 4.2, 4.4, 4.5, 5.10, 5.13, 6.3, 6.8, 6.9.1 (statement only)
2. Hogg and Craig : Introduction to Mathematical statistica (Third – Edition) Articles : 1.11, 3.5, 4.6, 5.4
3. Goon Gupta Dasgupta – An outlines of statistical theory volume - I Articles : 6.6, 7.14, 9.5, 11.3, (Case I) 12.1, 12.2, 13.4, 13.5,(Theorem 13.15 Theorem 13.17 statements only)
4. C.E. Weather bun : A First course in Mathematical Statistics, Articles : 89, 94, 109 to 118

Reference Book :

1.
2. – I
3. H. Cramer : Mathematical Methods of statistics.
4. S.S. Wilks : Mathematical Statistics.
5. Rohatgi V.K. : An Introduction to Probability Theory and Mathematical Statistics.

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T.Y.B.Sc.

Statistics

(PRINCIPAL)

STATISTICS PAPER - 302
(STATISTICAL INFERENCE)

Elements of decision theory: Concepts of decision function, loss function ;risk function, admissible decision functions, complete class for decision functions. Estimation and testing of hypothesis considered as decision problems.
Pont Estimation :Properties of estimators, unbiasendness, consistency, sufficiency and efficiency,

Cramer-Rao inequality, condition for equality and its use to obtain minimum variance unbiased estimators. (UMVUE), simple examples to show that Cramer-Rao bound may not be attained.

Optimum linear combination of independent unbiased estimators of the same parameter, prove that the sample mean is the best linear unbiased estimator (BLUE) of the population mean.

Methods of estimation: Method of moments, definition of likelihood function and maximum likelihood estimator, method of maximum likelihood, statement of the properties of maximum likelihood estimators.

Interval Estimation: Construction of confidence intervals for mean and variance, parameters of normal Distribution.
Testing of hypothesis: Hypothesis, critical region, two types of error, level of significance, size of test, power of a test, Neyman-Person lemma, the most powerful test of a simple hypothesis against a simple alternative; Elementary idea of likelihood ratio test.
Non parametric tests : Sign test, Wilcox on signed rank test, median test, run test.

The course is generally covered by,

1. P. G. Hoel: Introduction to mathematical statistics. (Third Edison)
   Articles : 3.1, 3.2, 3.3,3.9, 1.9, 2, 13.1, 13.2, 13.3,
2. Mood and Grybill : Introduction to the theory of statistics. (Second Edision)
   Articles:8.1,8.2,8.3,8.5,8.6,8.9,8.10,8.11,8.12,11.1,11.2,11.3,11.4,11.5,11.7,16.1,16.4 ,

3. Goon, Gupta, Das gupta : Fundamentals of statistics volume – I
   Articles: 15.1 to 15.7, 18.1 to 18.4,18.6,18.7,
4. M.C.Jaiswal : Statistical Distributions. (In Gujarati)
   Articles: 7.2,7.3,7.4,7.6,8.1 to 8.6,

Reference Books :

1. **Dude witz amd Mishra :**
2. **G. Shankaranarayanna : Elementary theory of mathematical statistics and its applications.**
3. ધર્માધિકારી - પટેલ : આકડાશાસ્ત્રીય અનુમાન
4. **Rohatgi V.K.: An Introduction to Probability Theory and Mathematical Statistics.**

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Statistics

(PRINCIPAL)

STATISTICS PAPER - VI – 303
(Sampling and Design of Experiments)

Sample surveys, sample random sampling, for proportion and percentages, estimation of sample size, Stratified random sampling, Non sampling errors.

Principles of randomization replication and local control. Analysis with fixed effect model and random effect model. Completely randomized design , Randomized block design, latin square design; Analysis of co- variance up to two way classification, Factorial experiments involving three factors at two levels only. Concept of confounding. Missing plot technique up to two missing observation only.

The Course is generally covered by.

1. Cochran W.G. : Sampling Techniques (Second Edition)

   Articles : 1.1 to 1.5, 2.1 to 2.7, 3.1 to 3.3, 4.1 to 4.5, 5.1 to 5.6, 8.1 to 8.4

   13.1 to 13.3 .

2. Cochran and Cox : Experimental Designs.

   Articles : 1.1 to 1.2, 2.1 to 2.4, 3.1 to 3.9, 4.1 to 4.3, 5.1 to 5.24.

3. Goon, Gupta ,Dasgupta : Fundamentals of statistics Volume – II

   Chapters : 20 and 21.

4. S.M. Shah : Sampling Techniques and Experimental Designs.(In

   Gujarati) Chapters : 2,3,4,9,10,11.

Reference Books :

1. Sukhatme and Sukhatme : Sampling Theory of Applications.
2. M.N. Murthy : Sampling Theory and Methods.
3. Des Raj : Analysis of variance.
4. Kempthrone : Design and Analysis of Experiment.
5. Federer : Experimental Design.
6. Montogemery D.C. : Design and Analysis of Experiments.

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T.Y.B.Sc. Statistics

Paper : 304 Applied Statistics

Demography: - Meaning and scope of demography history and growth surveys. Measures of population growth common measures of growth rate, growth surveys; Measures of mortality rates, National and prenatal mortality rates, standardized 6 age specific death rates with numerical examples; Life tables, cope, importance and limitation of life tables, different method of construction of life tables, abridged life tables, numerical examples to illustrate these methods, population projection, fertility and reproduction rates.

National Income: - Concept of National Income and methods of its estimation.

Matrix Algebra: - Matrix operation such as addition multipllcation , transpose, inverse and rank of matrix, Elementary transformation, Reduction to a normal form theorems of rank of a matrix, solution of system of linear equation.

INDEX NUMBER : Mcanning of index number charactcristics and uses of it constriction of price index number methods of computation of Laspayer, Paasche, Fisher Bowely, Marshal Edgeworth index numbers. TRT and FRT teste , constriction of cost of living index number limitation of price index number and cost of living index number.

DEMAND AND SUPPLY : Demand and supply function market equilibrium Elasticities of demand and supply.

Books recommended:

1. Statisitcal demography (1978) Mothen and co ltd. Ronald press.
2. Introduction to demography by spiegelman.
3. Statistics (Theory, methods & applications) Sultan Chand & Co, by D.C. Suncheti & V.K. Kapoor.
4. A text book of Matrices- Shantinarayan.
5. Statistics- III & IV – Bharat Prakashan, Ahmedabad.
6. Operation Research- Sharma S.D.

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Statistics

(PRINCIPAL)

STATISTICS PAPER –CAN COURSE
(OPERATION RESERCH)

Scope of O.R. Advantages of O.R. Different Models in O.R. General discussion of Linear Programming problem formulation, Graphical solution of LPP, Basic, Non Basic, Degenerate, Non – Degenerate and Basic feasible solution of LPP, convex & Concave sets, Properties of convex sets, convex concave functions, slack & Surplus variables, LPP in the standard matrix form, properties of solution of LPP, Generating extreme points solutions.

Theory and Practical of simplex method of solution of LPP, computation procedure, Big – M Method, Artificial basic Technique, Duality of LP the Non – symmetric & symmetric dual problems, Relation between primal & dual problems, Economical interpretation of duality, transportation problems, Methods for finding initial basic feasible solution, Optimal Solution of T.P. problem by Modi – method, Unbalanced TP, Assignment problems, the Hanganian Methods, Balance and Unbalanced assignment problems.

Game Theory :

Competitive games, Two – person Zero – sum game, Minimax & Maximin principles, Fundamental theorem of game theory, Saddle points and the value of the game (based on pure strategies) Mixed strategies , Solution of games with / without saddle point, Dominance rule, solution of mx2 and 2xn games using graphical method, Algebraic methods of solving games.

Inventory Models :

Basic definition of parametric association with inventory problems, various costs associated with inventory problems, Inventory models with infinite rate of replenishment, Finite rate of replenishment with & without shortages.

Queuing Theory :

Classification of queues, Poisson process and exponential distribution , Transient and steady states, Poisson queues with single service channel , Finite and infinite capacity and its characteristics .

The course is covered from the following reference books:

1. **J.K.Sharma : O.R/ Theory and applications Mac Millan India Ltd. 1998.**
2. **Kanti Swaroop : P.K. Gupta and Man Mohan : Operation Research, S.Chand & Sions, New Delhi 1995.**
3. **G. Hadly :Linear Programming, Narosa Publishing House, New Delhi 1995.**
4. **G. Paria : Linear Programming Transportation, Assignment, Game.Book & Allied Pvt. Ltd., Kolkota-9.**
5. **P. M. Karak : linear Programming , New Central Book Agency P. Ltd. KOLKOTA – 9.**
6. **K. V. Mittal & L. Mohan : Optimization methods in O. R. & System analysis. New Age Internatinal Publications,**
7. **Handy A. Taha : O. R. An Introduction, PHI Pvt. Ltd-1997**
8. **Goel & Mittal : O. R., Pragti Prakashan, Merrut.**
9. **Hilter & Leiberman : O. R., S. Chand & Sons. New Delhi.**

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T.Y.B.Sc.

Statistics

(PRINCIPAL)

305 Paper :- I **MARKS 50**

1. Fitting of multiple regression in case of trivariate data
2. Computation of multiple and partial correlation co-efficient using trivariate data and tesing their significance.
3. Z- Transformation for correlation co- efficient
4. Determination of rank of a matrix.
5. Computing measures of mortality and fertility. Construction of the life tables. Example involving life tables.

305 : PAPER – II **MARKS 50**

1. Estimation of parameters with their standards errors by the method of moments and by the method of maximum likelihood.
2. Calculation of power and drawing of power curves in case of binomial, poisson and normal distributions.
3. Non-parameters test (a) Run Test (b) Sign Test (c) Median test (d) Nilcoxm- signed test.

Statistics Practical : 305 Paper – III MARKS 50

1. Simple Random Sampling : Estimation of population mean and its variance, determination of sample size.
2. Stratified random sampling: Determination of sample size, Proportional and Nay man allocation and with given cost function . Comparison of stratified random sampling with random sampling under proportion and Nay man allocations.
3. Systematic sampling : Drawing a systematic sample, Estimation of Population mean.

305 Paper – IV MARKS 50

1. Analysis of variance for one-way and two way classifications.
2. Analysis of standard design viz CRD RBD, LS.D and their relative efficiencies. Missing plot technique in case of these designs for one and two missing observations only.
3. Analysis of factorial experiments up to 2^3 -levels.